

1 **Claims**

- 2 1. Apparatus for wireless duplex communication,
3 comprising, a first optical transceiver having a
4 first optical transmitter and a first optical
5 receiver, a second optical transceiver having a
6 first optical transmitter and a first optical
7 receiver, the first and second optical transceivers
8 being located at the opposite end of an optical
9 communication line formed thereby, wherein the
10 output of each of the optical transmitters is a
11 diverging beam of incoherent electromagnetic
12 radiation arranged to have a cross sectional
13 diameter which is larger than the cross sectional
14 diameter of the respective optical receiver at that
15 point on the communication line at which the
16 respective optical receiver is situated.
- 17 2. Apparatus as claimed in Claim 1 wherein the
18 optical transmitter emits electromagnetic radiation
19 having a range of wavelengths.
- 20 3. Apparatus as claimed in claim 2 wherein, the
21 optical transmitter emits radiation in the range 800
22 to 900 nanometres.
- 23 4. An apparatus as claimed in Claim 1 wherein the
24 optical transmitter comprises a light emitting diode
25 which provides the diverging beam of incoherent
26 electromagnetic radiation.
- 27 5. Apparatus as claimed in claim 4 wherein the
28 optical transmitter comprises the LED and further
29 comprises at least one optical condenser lens, the

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1 input to the optical condenser lens being provided
2 by the LED and the output of the optical transmitter
3 being provided by the optical condenser.

4 6. Apparatus as claimed in claim 1 wherein the
5 optical receiver consists of an optical condenser
6 lens, diaphragm and photodiode, wherein the
7 diaphragm is installed in the focal plane of the
8 optical condenser lens.

9 7. Apparatus as claimed in claim 6 wherein the
10 distance Δ between the photodiode and the diaphragm
11 situated in the focal plane of the optical condenser
12 lens is defined by the formula
13 $\Delta = b F / D_c$, where
14 b - diameter of the light-sensitive site of the
15 photodiode,
16 D_c - diameter of the optical condenser lens.
17 F - Focal distance of the optical condenser measured
18 from the lens of the optical condenser to the centre
19 of the stop operture.

20
21 8. Apparatus as claimed in claim 6 wherein the
22 input of the optical condenser is the input of the
23 optical receiver, and the output of the photodiode
24 is the output of the first optical receiver.

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26 9. Apparatus as claimed in claim 1 wherein the
27 beam angle θ characterizing of the first optical
28 transmitter and the first optical receiver of each
29 of the said transceivers is defined from the
30 following condition:

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1 Tan $2\theta = a / F$, where
2 a - diameter of the diaphragm aperture;
3 F - focal distance of the optical condenser measured
4 from the lens of the optical condenser to the centre
5 of the stop aperture.

6 10. Apparatus as claimed in claim 9 wherein the
7 beam angle is between 30 and 60 angular minutes.

8 11. Apparatus as claimed in claim 1 wherein the
9 distance between the optical transmitter and optical
10 receiver of a transceiver is greater than or equal
11 to $d/2$, where $d = 30\text{cm}$.

12 12. An apparatus as claimed in claim 1 wherein an
13 input of the optical transmitter of the first
14 transceiver is connected to an output of a converter
15 through a modulator, and an output of the optical
16 receiver of the first transceivers is connected to
17 an input of a demodulator, the output thereof being
18 connected to an input of a converter.

19 13. An apparatus as claimed in claim 1 wherein an
20 input of the optical transmitter of the second
21 transceiver is connected to an output of a converter
22 through a modulator, and an output of the optical
23 receiver of the second transceivers is connected to
24 an input of a demodulators, the output thereof being
25 connected to the input of a converter.

26
27 14. Apparatus as claimed in claim 12 wherein the
28 converter is made in the form of a transformer,
29 which transforms the signals of the input discrete
30 information into a coded signal using the Manchester

1 code during transmission, and which is capable of a
2 reverse transformation of signals coming from the
3 outputs of the respective demodulators during
4 reception.

5 15. Apparatus as claimed in claim 1 wherein each
6 optical transceiver further comprises a second
7 optical transmitter and a second optical receiver.

8 16. Apparatus as claimed in claim 12 wherein said
9 transceivers are connected to the input of the
10 respective demodulators through a summator.

11 17. Apparatus as claimed in claim 14 wherein the
12 input of the second optical transmitter of each of
13 the transceivers is connected to the output of the
14 respective modulator, and the outputs of the first
15 and second optical receivers is connected to the
16 input of the respective demodulator through a
17 summator.

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